

CLAIMS

What is claimed is:

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1. An insulating adhesive tape comprising:

an embossed reinforcing polymer layer, the embossed reinforcing polymer layer comprising a top face and bottom face, the embossed reinforcing polymer layer impressed using an impressing process;

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a first flexible layer, the first flexible layer covering the top face of the embossed reinforcing polymer layer and being used to improve the flexibility of the insulating adhesive tape; and

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an adhesive layer, the adhesive layer covering the bottom face of the embossed reinforcing polymer layer and being used to adhere the insulating adhesive tape to an object.

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2. The insulating adhesive tape of claim 1 wherein the embossed reinforcing polymer layer is composed of unhalogenated polymer materials, the unhalogenated polymer materials comprising poly(ethylene terephthalate) (PET), polyethylene naphthalate (PEN), polypropylene (PP), or polyimide (PI).

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3. The insulating adhesive tape of claim 1 wherein the draw ratio of the first flexible layer at 20°C is below 400%.

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4. The insulating adhesive tape of claim 3 wherein the first flexible layer is composed of flexible polymer materials, the flexible polymer materials comprising polyethylene (PE), acrylic, polyurethane resin (PU resin), ethylene vinyl acetate (EVA), or Surlyn™.

5. The insulating adhesive tape of claim 1 wherein the impressing process is used to form a plurality of pores that are randomly distributed throughout the embossed reinforcing polymer layer so as to enhance the flexibility of the embossed reinforcing polymer layer.
6. The insulating adhesive tape of claim 5, wherein after the impressing process a surface pretreatment process is performed to improve the affinity of the top face of the embossed reinforcing polymer layer for the first flexible layer.
7. The insulating adhesive tape of claim 6 wherein the surface pretreatment process is performed using a corona discharge technique, a flame burning technique, or a primer.
8. The insulating adhesive tape of claim 1 further comprising a second flexible layer on the embossed reinforcing polymer layer and the first flexible layer, the second flexible layer being used to increase both the flexibility and the thickness of the insulating adhesive tape.
9. The insulating adhesive tape of claim 8 wherein the draw ratio of the second flexible layer at 20°C is below 400%.
10. The insulating adhesive tape of claim 9 wherein the second flexible layer is composed of flexible polymer materials, the flexible polymer materials comprising polyethylene (PE), acrylic, polyurethane resin (PU resin), ethylene vinyl acetate (EVA), or Surlyn™.
11. The insulating adhesive tape of claim 8 wherein the first flexible

layer and the embossed reinforcing polymer layer are impressed using the impressing process to form a plurality of pores that are randomly distributed throughout both the first flexible layer and the embossed reinforcing polymer layer so as to enhance the flexibility of the insulating adhesive tape.

12. The insulating adhesive tape of claim 8 wherein the second flexible layer and the embossed reinforcing polymer layer are impressed using the impressing process to form a plurality of pores that are randomly distributed throughout both the second flexible layer and the embossed reinforcing polymer layer so as to enhance the flexibility of the insulating adhesive tape.

13. The insulating adhesive tape of claim 1 further comprising a release liner that is adjacent to the adhesive layer to maintain the adhesion feature of the adhesive layer.

14. The insulating adhesive tape of claim 1 further comprising a release agent coating that covers the first flexible layer; wherein the adhesive layer of the insulating adhesive tape will be adjacent to the release agent coating when the insulating adhesive tape is rolled up.

15. The insulating adhesive tape of claim 1 further comprising a electrically conductive layer that is used to prevent electro-magnetic wave interference (EMI) effects.

16. The insulating adhesive tape of claim 15 wherein the electrically conductive layer is composed of metallic materials, the electrically conductive materials comprising aluminum, copper, tin, silver, zinc, iron, alloy, or electrically conductive polymer.

17. The insulating adhesive tape of claim 16 wherein the electrically conductive layer is formed using a metal vapor deposition technique or a thermal laminated technique.

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18. The insulating adhesive tape of claim 17 further comprising a release agent coating that covers the electrically conductive layer; wherein the adhesive layer of the insulating adhesive tape will be adjacent to the release agent coating when the insulating adhesive tape is rolled up.

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